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(19)

(54) VICES AND HAND OPERATED CLAMPING TOOLS

(71) I, LEONARD ARTHUR STEBBINS, 10, Wordsworth Road, Maidstone, Kent, British, do hereby declare the invention,

for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to vices and hand operated clamping tools. In particular the invention relates to hand tools such as vices adjustable spanners and wrenches which have two relatively moving members between which there is a locking action and a tightening action.

The present invention provides, in a first aspect:—

A vice comprising:— a fixed body member incorporating a fixed jaw; a slide movable relative to the body member and incorporating a movable jaw; friction gripping means arranged in recesses in said body member to grip the said slide; a pivoted operating handle and a linkage mechanism operatively interconnecting the friction gripping means and the body member; characterised in that, during the pivoting of the handle to clamp an article between the jaws, the friction gripping means grips the slide, and moves the slide relative to the body member to move the movable jaw towards the fixed jaw to clamp the article, the linkage mechanism including an over-centre arrangement to retain the pressure on the article.

The present invention provides, in a second aspect:—

A hand operated clamping tool comprising, a body member with a fixed jaw and elongate shaft; a movable jaw slidable along the elongate shaft or pivotted to the elongate shaft so that it can be urged towards the fixed jaw; an abutment member slidable along the elongate shaft, said abutment member being lockable to the elongate shaft by a rocking action of said abutment member on said shaft or by a lever pivotting on the abutment member to grip the elongate shaft; and a linkage mechanism operatively interconnecting the abutment member and the movable jaw, and provided by a handle which pivots either directly on the abutment member or directly on said lever and a link which pivottally interconnects the handle and the said movable jaw to form an over-centre arrangement to retain the clamping pressure on an article; characterised in that, during pivotting of the handle to clamp an article between the jaws, the abutment member is frictionally locked to the elongate shaft, and the movable jaw is urged towards the fixed jaw to clamp the article.

It is envisaged that the invention may be applied to at least the following tools; bench vices, hand vices, adjustable spanners, adjustable wrenches, carpenters cramps and expanders.

Various preferred arrangements of the invention will now be described by way of example only and with reference to the accompanying drawings in which:—

FIGURE 1 is a diagrammatic plan view of a vice.

FIGURE 2 is a diagrammatic plan view of an adjustable spanner or wrench.

FIGURE 3 is a diagrammatic plan view for an alternative arrangement for the initial locking part of the vice or tool — shown in the unlocked position.

FIGURE 4 is a diagrammatic plan view showing the arrangement of Figure 3 in the locked position.

FIGURE 5 is a diagrammatic plan view of an alternative arrangement for the initial locking part of the vice or tool, here using outward pressure — shown in the unlocked position.

FIGURE 6 is a diagrammatic plan view showing the arrangement of Figure 5 in the locked position.

FIGURE 7 is a diagrammatic plan view of an alternative arrangement for the initial locking by outward pressure.

FIGURE 8 is a diagrammatic plan view of an alternative arrangement for the initial locking on a slim member.

FIGURE 9 is a diagrammatic plan view for an alternative arrangement for locking through a slim slotted member.

Referring firstly to Figure 1.

There is provided a slide 11 on the front end of which is incorporated an integral front jaw. Body member 12 which encloses slide 11 provides the fixed portion of the vice wherein the slide 11 runs. Integral with body member 12 is rear jaw 13 and side members 14 which guide the slide 11 and provide recesses 1 to house friction pads 15 which have limited movement in the said recesses 16. A control handle 17 is pivotted at 18 to the fixed body member 12, handle 17 extends outwards from the vice to a desired length. A link 20, which extends towards the jaws, is pivotally connected at its top end to a second pivot 19 on handle 17 and the lower end of link 20 is pivotted at 21 with the two links 22 which extend outwards to be pivotally connected with the friction pads 15 by pivots 23. There are also provided springs 24 which are located between the tops of the friction pads 15 and the top faces of the recesses 16. A stop 25 fixed to member 12 provides at its top end means of limiting the anti-clockwise movement of the control handle 17 and provides at its lower end a control screw to vary the degree of clockwise movement of handle 17.

The vice is shown in Figure 1 in the unlocked position and slide 11 is completely free to move within fixed body member 12. The article to be gripped is placed between the jaws and the slide 11 is pushed inwards until both jaws make light contact with the article. Handle 17 is rotated anticlockwise on pivot 18 thus causing pivot 19 to lift link 20 upwards so causing pivot 21 and links 22 to move upwards, thereby pulling friction pads 15 fractionally inwards to firmly grasp the slide 11 and pull it and its integral front jaw upwards so tightening on the article held. Further progression of handle 17 will swing the top end of link 20 and its pivot 19 over the centre of pivot 18 so creating a locked position, further handle movement in this direction is prevented by the top end of stop 25. During this movement the springs 24 have been compressed. On returning the handle to its original position the linkage is obliged to its original position and the friction pads 15 release their grip on the slide 11 so that the springs 24 impel friction pads 15 to their original position thereby releasing the article held. The cycle may be repeated and if desired the front jaw may be inched towards the rear jaw by repeated action of the handle 17 when the jaws are empty.

Referring now to Figure 2.

There is provided a body member with a fixed jaw and elongate shaft 31 to which is pivotted at 46 lower jaw 32 with its integral top plate 33. Slidable along body member 31 is abutment member 42 which carries a stop 45 and a pivot 43 on which lever 35 pivots near its inner end. On its outer end lever 35 is pivotted at 38 to a handle 37. Handle 37 has a second pivot 39 which connects the handle pivotally with the lower end of link 40 and link 40 has a second pivot 41 which pivotally connects link 40 with the lower jaw 32. Spring 44 which is sprung between pivots 46 and 39 is provided to assist handling. In operation — to release the jaws handle 37 is pulled away from elongate shaft 31 so that the top end of handle 37 pivotting with link 40 at pivot 39 is moved and or pulled inwards by spring 44. This action fractionally lifts the outer end of lever 35 thereby releasing the pressure at its heel on elongate shaft 31. With the handle 37 in that position abutment member 42 may be slid down elongate shaft 31 against the spring tension thereby opening the lower jaw to the desired amount. When the abutment member 42 is released by the hand the jaws will automatically close on an article by the spring tension. On closing the handle, the outer end of lever 35 is forced downwards so causing its inner heel to bite against and grip elongate shaft 31 and the link 40 is forced upwards so closing the jaws. Pivot 39 which has moved clockwise has passed through the dead centre position thereby locking on the article held, further progress of the handle 37 is stopped when its tail end meets the elongate shaft 31. In this closed position the tension spring is not strong enough to release the grip at the jaws.

Referring now to Figures 3 and 4.

These show an alternative method of locking the abutment member 71 to the elongate shaft 31 but which also could apply to locking the slide 11 to the body 12. In this arrangement a pair of angle plates 70 each with arms mutually at right angles replace the lever 35. The horizontal arms of angle plates 70 will allow abutment member 71 to be moved upward on elongate shaft 31 when an upward force is applied at pivot 38A — see Figure 3. Conversely when a downward force is applied at pivot 38A the horizontal arms of angle plates 70 do not restrain the angular movement of abutment member 71 thus allowing abutment member 71 to tip fractionally downwards thereby tightening the angle plates 70 on elongate shaft 31 and

effectively locking thereon — see Figure 4.

Referring now to Figures 5 and 6.

This is a further alternative initial locking method, in this case elongate shaft 31 provides two parallel walls wherein runs cam 73 to which is fixed abutment member 71A. Elongate shaft 31 may be a hollow box section provided with a slot on one side to allow abutment member 71A to slide therein. Figure 5 shows the position which allows movement upwards when an upwards force is applied to pivot 38B and Figure 6 shows the locking effect when a downward force is applied to pivot 38B.

Referring now to Figure 7.

This is an alternative arrangement of the vice shown in Figure 1. Here the initial locking effect is achieved by outward pressure of the friction pads 15A from recesses 16A on outer parallel walls provided on slide 11A. Pivot 18A is mounted on body member 12A.

Referring now to Figure 8.

There is shown an alternative arrangement of part of the tool shown in Figure 2. Here a friction pad 50 has been inserted between lever 35A and elongate shaft 31. Lever 35A has a rounded portion at its inner end which engages a compatible cut out portion 51 in friction pad 50. When lever 35A is rotated anti-clockwise as shown it causes friction pad 50 to bite against elongate shaft 31 so creating a locked position, and vice versa.

Referring now to Figure 9.

This is an alternative arrangement to Figure 8, in this case the abutment member 42B supporting the lever pivot 43B slides in a slot in elongate shaft 31A and the left hand friction pad 50A slides on the abutment member 42B which is supporting the lever pivot 43B and is integral with a right hand friction pad 60.

With general reference to the designs shown, the surfaces of the members on which the friction pads, levers or plates make contact may be roughened or treated in such a way as to increase their frictional properties. Slides 11 or elongate shafts 31 which carry the sliding members may be minutely tapered so that the thickness of these members is fractionally greater at the point where the jaws are farthest apart. Where the lever method of initial locking is employed the inclusion of the additional friction pad as shown in Figures 8 and 9 may be desirable. A single movement of handle 17 or 37 initially locks the jaws against relative movement and then tightens the jaws and locks on the article gripped. The amount of secondary movement or tightening is varied by the amount of handle movement, the amount of movement may be a matter for the operators judgement or variable stops may be employed as in Figure 1. Springs either to urge handles or jaws open or closed may be employed to suit particular applications. The clamping action of the tool or vice may be converted to an expanding action by removing the sliding members, turning the slide or elongate shaft through 180 degrees and re-inserting the slide or elongate shaft into the sliding members. This is provided that the slide or elongate shaft are not tapered. The jaws may be either smooth or serrated, they may be provided with cutting edges, they may be straight or curved.

WHAT I CLAIM IS:—

1. A vice comprising:— a fixed body member incorporating a fixed jaw, a silde movable relative to the body member and incorporating a movable jaw, friction gripping means arranged in recesses in said body member to grip the said slide, a pivoted operating handle and a linkage mechanism operatively interconnecting the friction gripping means and the body member, characterised in that, during the pivotting of the handle to clamp an article between the jaws, the friction gripping means grips the slide, and moves the slide relative to the body member to move the movable jaw towards the fixed jaw to clamp the article, the linkage mechanism including an over-centre arrangement to retain pressure on the article.

2. A hand operated clamping tool comprising, a body member with a fixed jaw and elongate shaft, a movable jaw slidable along the elongate shaft or pivotted to the elongate shaft so that it can be urged towards the fixed jaw, an abutment member slidable along the elongate shaft, said abutment member being lockable to the elongate shaft by a rocking action of said abutment member on said shaft or by a lever pivotting on the abutment member to grip the elongate shaft, and a linkage mechanism operatively interconnecting the abutment member and the movable jaw and provided by a handle which pivots either directly on the abutment member or directly on said lever and a link which pivotally inter-connects the handle and the said movable jaw to form an overcentre arrangement to retain the clamping pressure on an article gripped; characterised in that, during pivotting of the handle to clamp an article between the jaws, the abutment member is frictionally locked to the elongate shaft, and the movable jaw is urged towards the fixed jaw to clamp the article.

3. A vice as claimed in claim 1 wherein the slide is locked by friction pads that are caused to expand within parallel walls substantially as shown in Figure 7 of the accompanying drawings.

4. A tool as claimed in claim 2 wherein the abutment member is initially locked to the elongate shaft by an internally expanding cam arrangement substantially as shown in Figures 5 and 6 of the accompanying drawings.

5. A tool as claimed in claim 2 wherein the abutment member is initially locked relative to the elongate shaft by a pair of locking plates with arms mutually at right angles substantially as shown in Figures 3 and 4 of the accompanying drawings.

6. A tool as claimed in claim 2 wherein the abutment member is initially locked to the elongate shaft substantially as shown in either Figure 8 or 9 of the accompanying drawings.

7. A vice as claimed in claim 1 wherein the gripping of the slide is caused by means substantially as shown in any one of the Figures 2, 3, 4, 5, 6, 8 or 9 of the accompanying drawings.

8. A vice or tool as claimed in any one of the preceding claims wherein control springs are provided to facilitate the operation of the vice or tool.

9. A vice or tool as claimed in any of the preceding claims wherein stops are provided to limit the handle movement.

10. A vice or tool as claimed in any one of claims 1 to 9 wherein the slide or elongate shaft is tapered towards its jaw end so that the locking action is made more positive.

11. A vice or tool as claimed in any one of claims 1 to 10 wherein the jaws may be smooth or serrated.

12. A vice or tool as claimed in any one of claims 1 to 11 wherein the jaws may be straight or curved.

13. A tool as claimed in claims 2 and 4 to 6 and 8 to 12 wherein the jaws are provided with cutting blades.

14. A vice or tool as claimed in claims 1 and 2 wherein the slide or elongate shaft is inserted in the reverse direction to provide an expander.

15. A vice or a hand operated clamping tool substantially as hereinbefore described with reference to the accompanying drawings.

L. A. STEBBINGS.

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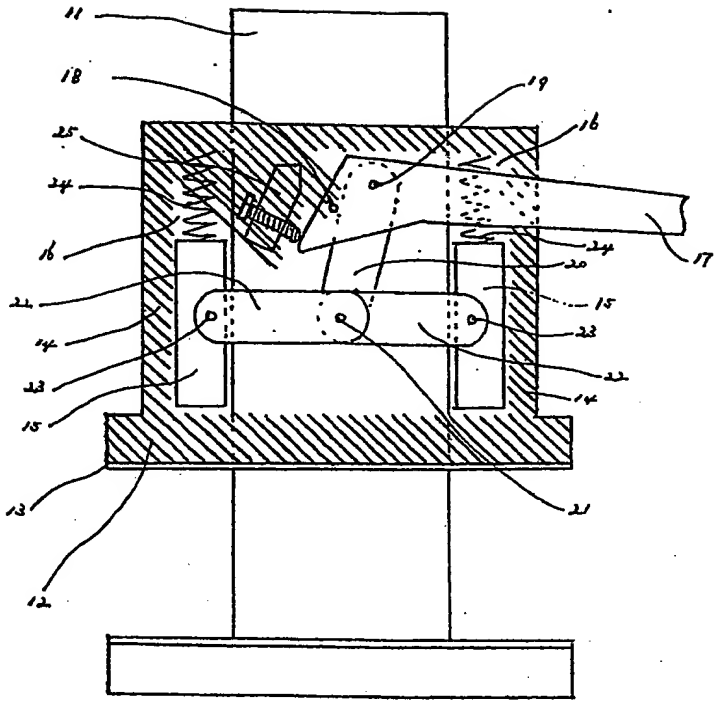
Sheet 1

FIG. I



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Sheet 2

FIG.2

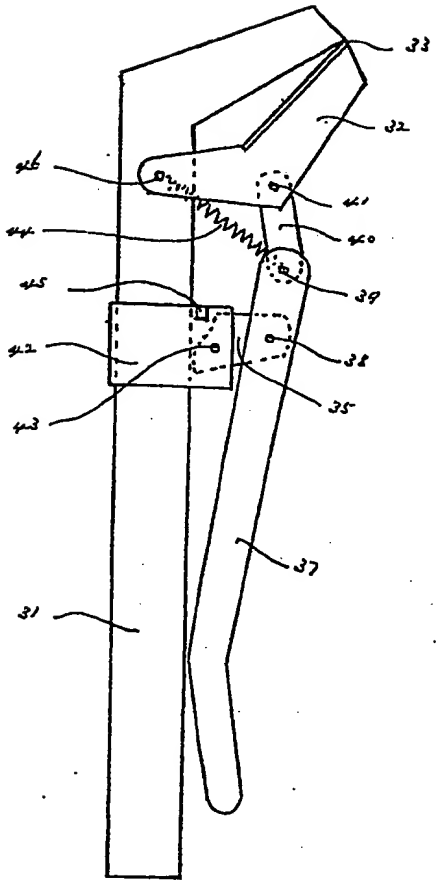

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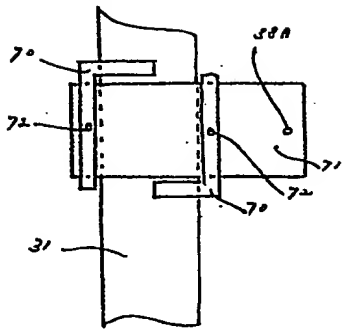
FIG.3



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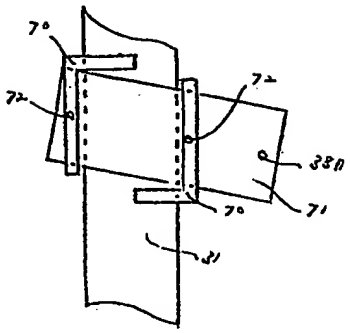

FIG.5

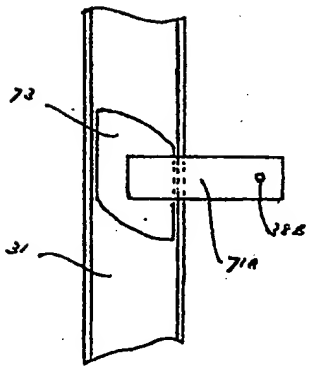

FIG.6

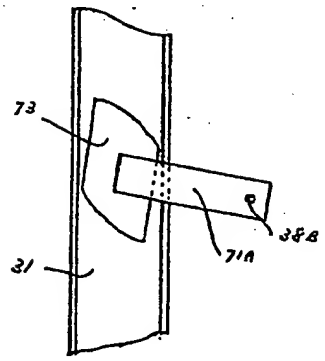

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FIG.7

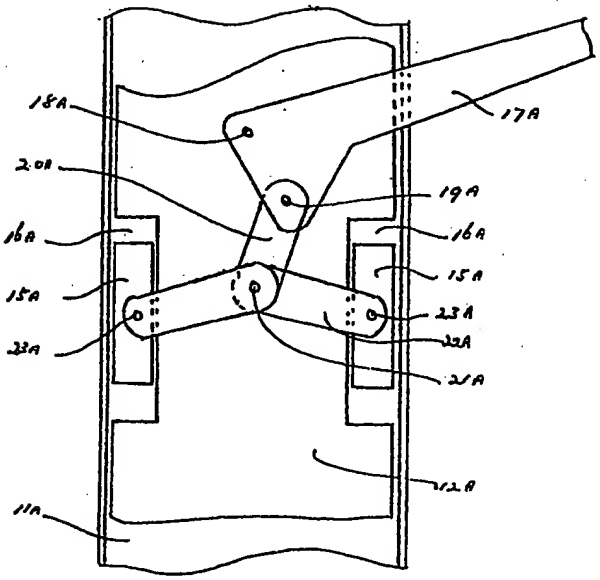

FIG.8

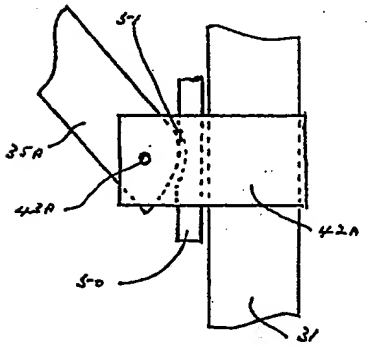

FIG.9